Influence of diagenetic processes in Thau lagoon on cadmium behavior and benthic fluxes

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Résumé en anglais	DGT (Diffusive Gradient in Thin-films) and DET (Diffusive Equilibration in Thin-films) combined probes were used in Thau lagoon sediments to describe variations of dissolved concentrations of metals such as cadmium, manganese and iron, through the sediment–water interface. Two contrasted stations regarding organic carbon fluxes were studied from December 2001 to May 2003 during four field campaigns: station C4 in the middle of the lagoon, and station C5 in a shellfish-farming zone. Laboratory experiments and field deployments in such environment showed that DGT sampled pore water labile cadmium whereas iron and manganese concentrations were underestimated. These results suggest that no steady state in the flux of metals onto the gel was established for Fe and Mn. Kinetics of metal sulfide dissolution–precipitation may control metal fluxes onto the gel probe in marine sedimentary environments. Analysis of sediment and water column samples showed cadmium concentrations above natural background (3.3 and 7.6 nmol kg−1 for station C4 and station C5 sediments, respectively; between 40 and 800 pmol L−1 for the water column), suggesting contamination. Spatial and temporal patterns of cadmium behavior were observed. The sediment at station C4 was generally a source of cadmium whereas at station C5 it was a sink. The vertical extension of the diagenetic series was more important at station C4 with deeper oxygen penetration and lack of dissolved sulfide whereas station C5 showed steep ∑H2S gradients at the same depths. The data suggested that cadmium source was more likely organic matter. Cadmium mobility was probably controlled by aerobic mineralization at station C4 and by dissolution–precipitation of sulfides at station C5. Seasonal variations were observed in the depth of oxygen penetration and sulfide diffusion generating important remobilization of cadmium during December 2001. Conversely in May 2003 at station C5, bottom water suboxic conditions (i.e. %O2 = 60) enhanced reductive conditions in the sediment favoring uptake of cadmium by the sediment from the water column.
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